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PATENT APPLICATION TRANSMITTAL LETTER

Case Docket No.: M-95-3195-U.20-CIP

To:

THE COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231-9998

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09/641790
08/18/00

Sir:

Transmitted herewith for filing is the patent application of

INVENTOR: Carlos Neto MENDES

FOR: "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM and CONFIGURATION FOR A
SELF-CLEANING FILTER FOR THE EXTRACTION OF FRUIT JUICE"

Enclosed are:

(XX) EIGHT (8) Sheets of Drawing Figures (FIGURES 1 - 13).

() An assignment of the invention to _____

() A certified copy of a _____ application.

() An associate power of attorney.

(XX) A verified statement to establish small entity status under 37 CFR 1.9 and
37 CFR 1.27.

The filing fee has been calculated as shown below:

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FOR:	NO. FILED	NO. EXTRA
BASIC FEE		
TOTAL CLAIMS	46 - 20 =	* 26
INDEP CLAIMS	10 - 3 =	* 7
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENTED		

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Page 2 of 2

Attorney Docket No.: M-95-3195-U.20-CIP

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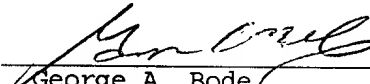
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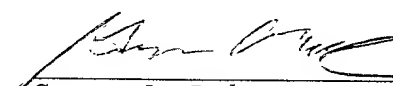
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George A. Bode, Esq. - Reg. No. 30,028

Applicant or Patentee: Carlos MENDES Neto Attorney's
Serial or Patent No.: _____ Docket
Filed or Issued: _____ No.: M-95-3195-U,20-CIP
For: "Improvements In A Modular ... Extraction Of Fruit Juices"

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY
STATUS (37 CFR 1.9(f) and 1.27(b)) - INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled same as "For" above, described in

- (X) the specification filed herewith.
() application serial no. _____, filed _____.
() patent no. _____, issued _____.

I have not assigned, granted, conveyed, or licensed and am under no obligation under contract or law to assign, grant, convey, or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern, or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- (X) no such person, concern or organization.
() persons, concerns or organizations listed below:*


*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27).

FULL NAME: _____

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I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issued thereon, or any patent to which this verified statement is directed.

Carlos MENDES Neto
NAME OF INVENTOR NAME OF INVENTOR NAME OF INVENTOR

Signature of Inventor Signature of Inventor Signature of Inventor
11 July 2000
Date Date Date

APPLICATION FOR
U.S. LETTERS PATENT
FOR

"IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION
SYSTEM and CONFIGURATION FOR A SELF-CLEANING
FILTER FOR THE EXTRACTION OF FRUIT JUICE"

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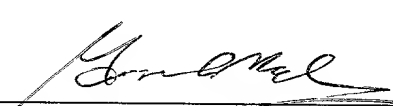
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This application is a continuation-in-part
application of the previous applications by the same
inventor listed in Schedule A which is attached to the
Inventor's Declaration.

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George A. Bode, Esq.
Reg. No. 30,028

**"IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION
SYSTEM and CONFIGURATION FOR A SELF-CLEANING FILTER FOR
THE EXTRACTION OF FRUIT JUICE"**

5 This application is a continuation-in-part
application of previous applications by the same inventor
bearing:

10 1) U.S. Serial No. 08/647,066 filed May 9, 1996,
(which claims priority, under 35 U.S. Code § 119 based on
Brazilian Application No. PI-9502244-9 filed June 19,
1995), now U.S. Patent No, 5,655,441 issued August 12,
1997;

15 2) U.S. Serial No. 08/681,627 filed July 29, 1996,
(which claims priority, under 35 U.S. Code § 119 based on
Brazilian Application No. MI-5501198-5 filed August 1,
1995) now U.S. Patent No, 5,720,218 issued February 24,
1998;

20 3) U.S. Serial No. 08/681,626 filed July 29, 1996,
(which claims priority, under 35 U.S. Code § 119 based on
Brazilian Application No. MU-7501779-2 filed August 1,
1995);

4) U.S. Serial No. 08/759,723 filed December 6,
1996, (which claims priority, under 35 U.S. Code § 119
based on Brazilian Application No. MU-7502784-4 filed
December 8, 1995);

August 7, 1995; No. MI-5501053-9 filed August 7, 1995;
No. MI-5501976-5 filed December 8, 1995; No. MU-7502784-4
filed December 8, 1995; No. MU-7502785-2 filed December
8, 1995; No. MU-7502786-0 filed December 8, 1995; and,
5 No. MU-7502994-4 filed December 15, 1995);

9) U.S. Serial No. 09/028,187 filed February 23,
1998, (which claims priority, under 35 U.S. Code § 119
based on Brazilian Applications No. PI-9502218-0 filed
June 12, 1995; No. PI-9502244-9 filed June 19, 1995; No.
10 MI-5501197-7 filed August 1, 1995; No. MI-5501198-5 filed
August 1, 1995; No. MI-5501199-3 filed August 1, 1995;
No. MU-7501779-2 filed August 1, 1995; No. MU-7501780-6
filed August 1, 1995; No. MU-7501781-4 filed August 1,
1995; No. PI-9503518-4 filed August 1, 1995; No. MU-
15 7501563-3 filed August 7, 1995; No. PI-9503109-0 filed
August 7, 1995; No. MI-5501053-9 filed August 7, 1995;
No. MI-5501976-5 filed December 8, 1995; No. MU-7502784-4
filed December 8, 1995; No. MU-7502785-2 filed December
8, 1995; No. MU-7502786-0 filed December 8, 1995; and,
20 No. MU-7502994-4 filed December 15, 1995);

10) U.S. Serial No. 09/377,936 filed August 20,
1999, (which claims priority, under 35 U.S. Code § 119
based on all of the applications in Items 1 - 9 above);

and,

11) U.S. Serial No. 09/377,937 filed August 20, 1999, (which claims priority, under 35 U.S. Code § 119 based on all of the applications in Items 1 - 9 above).

5 The entirety of these previous applications are incorporated herein by reference as if set forth in full below.

The present patent of invention refers to both "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM and CONFIGURATION FOR A SELF-CLEANING FILTER FOR THE EXTRACTION OF FRUIT JUICE." For "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM" or be it, as the nomenclature implies, a system developed with the purpose of obtaining juice from citrus fruit such as orange, grapefruit, lemon, lime, tangerine, mekan, pokan, etc., and other round or near-round non-citrus fruit. The important characteristics of the present system includes: compactness, modularity, durability, simplicity and the highest quality of the juice obtained form extraction. For "CONFIGURATION FOR A SELF-CLEANING FILTER FOR THE EXTRACTION OF FRUIT JUICE" or more fully, "IMPROVED CONFIGURATION FOR A SELF-CLEANING FILTER WITH REMOVABLE PERFORATING POINT FOR THE EXTRACTION OF FRUIT JUICE," or

be it, as the nomenclature implies, a cylindrical filter constructed of stainless steel or other food grade, nontoxic materials developed with the purpose of obtaining juice from citrus fruit such as orange, grapefruit, lemon, lime, tangerine, mekan, pokan, etc., and other round or near-round non-citrus fruit. The important characteristics of the present configuration includes: better filtration efficiency, greater juice yield as well as increased self-cleaning and sanitization characteristics obtained due to its design, compactness and simplicity thus contributing further to increase juice quality and juice yield as obtained in fruit juice extraction processes.

THE STATE OF THE ART

The state of the art is known from previous patents by the same inventor, including US Patent 5,655,441, Patent 5,720,218, Patent 5,720,219 and Patent 5,802,964, which revolutionized the market by introducing a method of juice extraction which eliminated the traditionally bitter tastes in citrus juices, by eliminating the contact of peel with the juice being extracted.

This equipment primarily based its advantages in the process of peeling the fruit before juice extraction, by

that a cylindrically shaped fruit core can be separated from other parts of the fruit and that said fruit core can ultimately be pumped completely into the cylindrical filter with radial slits. Since the cylindrical filter has a multitude of radial slits along its body, this allows the juice to flow through said slits and gravitate into a space around the filter defined as the juice collector chamber. Since the juice collector chamber has an opening at one of its ends, the juice is able to flow through the opening and fall into a juice reservoir, which is placed directly underneath said juice collector.

In the juice extraction systems described above, the cylindrical filters are subject to continuous duty operation where the perforating cutting edged points are subject to wear and damage while the remainder of the filter is protected from such possible break downs. Also the parallel shaped slits, while permitting juice to flow through, will occasionally clog and cause higher pressures in the chamber to occur, thus decreasing filtration performance. The filter must therefore be taken out for cleaning and sanitization in order to return to its optimal performance capabilities.

Other advances have been introduced in this system

and have been the object of other patents and patent applications, nevertheless, always encompassing the original scope of the basic invention.

OBJECTIVES OF THE INVENTION

5 The present invention in "IMPROVEMENTS IN A MODULAR
FRUIT JUICE EXTRACTION SYSTEM" maintains the primary
characteristics of the original patents, nevertheless,
its objective is to propose a unique modular
configuration where the movement of the movable peeler
10 cups, within the scope of a modular system, is configured
in a manner that fruit juice can be extracted at both
ends of this basic module and the linear drive motion of
the moveable peeler cups is configured such that both
movable peeler cups can be driven by a single linear
15 actuator. This solution not only generates a large
cost/benefit advantage since the productivity of each
complete extraction cycle is doubled, it also generates
a singular and innovative basic module that can be
aligned in parallel with other basic modules, or any
20 other geometrical configurations, in manners that large
numbers of these modules can be placed and arranged to
multiply greatly the total productivity of small, medium
or large fruit juice production plants.

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The quality and organoleptic characteristics of the juice extracted is maintained as described in the original patents, and greatly improved in relation to older technologies, be it those of small, medium or large scale machinery. The high degree of modularity, and therefore scaleability, is an important benefit of the invention here proposed, as it facilitates and permits growth of productivity on a modular basis, allowing for an initial single module to be used and permitting that, over time, many, perhaps 100 or more, modules can be installed in juice production facilities, permitting flexible and economic growth of one's juice production plant. This is an important feature of this invention because this permits smaller scale juice production facilities to grow to extremely large, multi-million-gallon per year juice plants, and, independently of size or production capabilities, to gain the advantages of the quality and organoleptic improvements in the juice extracted.

20 In general terms, the objective of this invention is a concept of a machine composed of two pairs of peeler cups where for each fixed peeler cup, attached to the basic structure of the machine, and an equivalent and

electric, geared, screw and/or any combination of known
linear drive systems. Since the drive movement is
restricted to a simple linear back and forth action, one
can assure greater simplicity of construction and
5 therefore greater reliability, less energy consumption,
lower weight and lower manufacturing costs with this
invention, as compared to older nonlinear actuation
systems that employ, cams, cam followers, gearboxes,
electrical motors, levers, springs, and other
10 complicated, more numerous and less reliable and more
costly devices and systems.

The present invention in "CONFIGURATION FOR A
SELF-CLEANING FILTER FOR THE EXTRACTION OF FRUIT JUICE"
maintains the primary characteristics of the original
15 patents, nevertheless, its objective is to propose a
simple and unique configuration that improves filtration
performance and adds to operational flexibility,
increases filter life and contributes significantly to
improving the cost/benefit and economic performance of
20 this important component in the fruit juice extraction
process. The quality and organoleptic characteristics of
the juice extracted is maintained as described in the
original patents, and greatly improved in relation to

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5 replacement and permits for interchangeability with
differently shaped cutting edges which can vary as
desired in order to obtain better juice extraction
performance on the many varieties of citrus and other
fruit.

Other important improvements obtained from this
invention are greater efficiency and yield in juice
extraction, as a function of the conical, or V-shaped,
profile of the multiple transverse radial slits, since
10 this shape generates a greater pressure differential
between the inside and outside portions of the filter, in
fact, inducing a "Venturi Effect" which accelerates fluid
flow from the inside to the outside of the filter, thus
promoting greater juice yield and greater productivity
15 and helping greatly to maintain these passageways clear
of obstructions and reducing clogging and cleaning
frequency.

ADDITIONAL CONFIGURATIONS

The present invention in "IMPROVEMENTS IN A MODULAR
20 FRUIT JUICE EXTRACTION SYSTEM" contemplates various
interchangeable versions or embodiments of detailed
configurations, differences mostly are related to the
peeler cups, expulsion of the fruit's core through one of

the peeler cups, actuation of the plunger and its function to expel the fruit's dried core, after the juice has been extracted and filtered. A first version or the preferred embodiment is configured in a manner such that

5 the plunger is driven by two linear actuators mounted parallel to the main peeler cup actuator, so that when driven, these two linear actuators will pull on in-line rods that are attached to a cross member which is fixed to the plunger so that the plunger will move linearly

10 inside the filtering device, pushing the fruit's core until it has reached the opening of the filter and overshooting until the core is totally expelled and permitted to fall vertically within, and through the peeler cups, and finally dropping into the core receiving

15 duct.

In a second embodiment or version, the machine is configured in a manner such that the plunger is driven by the returning motion of the moveable peeler cup itself, since the in-line pull rods are attached to the cross

20 members that hold the moveable peeler cups, and as the machine is cycled normally through its back and forth motion, the in-line rods, that are attached to a cross member which is fixed to the plunger, will drive the

plunger to move linearly inside the filtering device,
pushing the fruit's core until it has reached the opening
of the filter and overshooting until the core is totally
expelled and permitted to fall vertically within and
5 through the peeler cups and, finally dropping into the
core receiving duct.

In another embodiment or version, the plunger is
driven in same manner as twice described before above,
but the drive is provided by direct force being applied
10 to the plunger by independent linear actuators mounted
directly on the machine's basic structure, one at each of
the opposite extreme ends of said machine.

In a third embodiment or version, the expulsion of
the fruit's core is through the back side of the movable
15 peeler cup.

In a fourth embodiment or version, the expulsion of
the fruit's core through the back side of an internal
movable peeler cup.

BRIEF DESCRIPTION OF THE DRAWING

20 The invention will be described in the following
attached drawing figures, which will illustrate details
including:

FIGURE 1: A side cross-sectional view of the

invention, as described before, in its first or preferred
embodiment or version, showing, on the left side, a
moveable peeler cup in the full open position, as well as
the expulsion of the fruit's core and its falling into
5 the fruit core collector duct, as well as the vertical
falling of the sheared peeled skins. On the right side,
one can observe the closed position of the moveable
peeler cup, fully engaged with the fixed peeler cup, as
well as the juice being filtered through the filtering
10 device while the fruit's core remains inside the filter
itself at this point in the extraction cycle. Also shown
is the juice being collected in the juice collection
chamber, sheared peel skin strips falling vertically down
and, finally, dried fruit cores falling further through
15 the fruit core receiving duct, in a manner that all of
the byproducts being produced can now be directed
respectively to other stages of processing;

FIGURE 2: A top view of the embodiment of the
invention of FIGURE 1 taken along the LINE A-A (or "VISTA
20 A-A") of FIGURE 1;

FIGURE 3: A front view of the invention of
FIGURE 1 ;

FIGURE 4: A side cross-sectional view of the

invention, as described before, in its second embodiment or version, showing, on the left side, a moveable peeler cup in the full open position, as well as the expulsion of the fruit's core and its falling into the fruit core collector duct, as well as the vertical falling of the sheared peeled skins. On the right side, one can observe the closed position of the moveable peeler cup, fully engaged with the fixed peeler cup, as well as the juice being filtered through the filtering device while the fruit's core remains inside the filter itself at this point in the extraction cycle. Also shown is the juice being collected in the juice collection chamber, sheared peel skin strips falling vertically down and, finally, dried fruit cores falling further through the fruit core receiving duct, in a manner that all of the byproducts being produced can now be directed respectively to other stages of processing;

FIGURE 5: A top view of the invention, in its second embodiment or version of FIGURE 4 taken along the LINE A-A (or "VISTA A-A") of FIGURE 4. The third embodiment or version is NOT SHOWN in the drawing;

FIGURE 6: A partial perspective view of the main body the filter showing the conical section

transverse radial slits and the removable cylindrical perforating cutting edge as attached to the main body of said filter;

FIGURE 7: A side view of the filter showing the conical section transverse radial slits and the removable cylindrical perforating cutting edge as attached to the main body of said filter;

FIGURE 8: A typical cross sectional view of the main body of the filter;

FIGURE 9: A longitudinal cross sectional segment view of the main body of the filter showing the conical, or V-shaped, nature of the transverse radial slits through which the juice flow through;

FIGURE 10: A side cross-sectional view of the invention, as described before, in its third embodiment or version, showing, on the left side, a moveable peeler cup in the full open position, as well as the expulsion of the fruit's core through the back side of the movable peeler cup and its falling into the fruit core collector duct, as well as the vertical falling of the sheared peeled skins. On the right side, one can observe the closed position of the moveable peeler cup, fully engaged with the fixed peeler cup, as well as the juice being

filtered through the filtering device while the fruit's core remains inside the filter itself at this point in the extraction cycle. Also shown is the juice being collected in the juice collection chamber, sheared peel skin strips falling vertically down and, finally, dried fruit cores falling further through the fruit core receiving duct, in a manner that all of the byproducts being produced can now be directed respectively to other stages of processing;

10 FIGURE 11: A top view of the embodiment of the invention of FIGURE 10 taken along the LINE 11 - 11 of FIGURE 10;

15 FIGURE 12: A side cross-sectional view of the invention, as described before, in its fourth embodiment or version, showing, on the left side, external and internal moveable peeler cups in the full open position, as well as the expulsion of the fruit's core through the back side of the internal movable peeler cups and its falling into the fruit core collector duct, as well as
20 the vertical falling of the sheared peeled skins. On the right side, one can observe the closed position of the moveable peeler cup, fully engaged with the fixed peeler cup, as well as the juice being filtered through the

filtering device while the fruit's core remains inside the filter itself at this point in the extraction cycle. Also shown is the juice being collected in the juice collection chamber, sheared peel skin strips falling vertically down and, finally, dried fruit cores falling further through the fruit core receiving duct, in a manner that all of the byproducts being produced can now be directed respectively to other stages of processing; and,

10 FIGURE 13: A top view of the embodiment of the invention of FIGURE 12 taken along the LINE 13 - 13 of FIGURE 12.

DETAILED DESCRIPTION OF THE INVENTION

15 The "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM," object of this application for patent of invention, consists essentially of a modular system shown in four optional and functionally interchangeable embodiments or versions, which vary in the drive configuration of the plunger, its function being to expel the dried fruit core and, in so doing, clear the way for receiving a new fruit to be juiced; and the means for expelling the fruit's core through the back side of a movable peeler cup.

20

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In the first or preferred embodiment or version, best seen in FIGURES 1 - 3, a linear actuator (2) drives moveable peeler cups (4) (concave and radially cut hemispheres), be it by hydraulic, pneumatic, screw, electrical or other linear motion drive device, in a manner such that the moveable peeler cup (4) at one end of the machine is closing in relation to the fixed peeler cup (3) at the same end, while the other peeler cup (4), at the opposite end of the first, is opening with respect to its matching fixed peeler cup (3). In so doing, and by the nature of the back and forth motion of the linear drive device, there is a doubling of the productivity of the machine cycle. The machine cycle encompasses the linear movement of the two moveable peeler cups (4), each attached to one of the two extreme ends of the linear actuator (2) and guided linearly by the guide rails (17) which slide on bearing seats (18) mounted transversely and coincidentally with each other, being that the moveable peeler cups (4) move in the direction of the fixed peeler cups (3) which in turn are firmly attached to a structural chassis (1), while the motion of said moveable peeler cups (4) is solidly transmitted to vertical rods (6), in a synchronized manner such that

these vertical rods will touch and initiate a linear dislodging of the feeder mechanism's spring (5), thus allowing one of the fruit (19) to drop through the feeder duct and into the chamber formed by the intermeshing of the moveable peeler cup (4) and its matched pair fixed peeler cup (3).

In continuation of the extraction cycle, the fruit (19) now held in the chamber formed by the intermeshing of the moveable peeler cup (4) and its matched pair fixed peeler cup (3), is then pressed by the moveable peeler cup (4) into the fixed peeler cup (3), since both have multiple radially cut openings, the action causes the skin of the fruit to be sheared in multiple strips (12) which pass through the peeler cups' radial openings and fall vertically, while the fruit's core (13) is taken inside the filtering device (7 or F) since this filtering device has a circular sharp cutting point at its forward opening, permitting the fruit's core (13) to enter completely into the filter (7), which has radially cuts slits which allow for the extracted juice (11) to flow through and be collected in the space formed by the inside of the fixed peeler cup (3) and the juice collector (10).

cups, the juice extraction cycle is exactly identical and fully described above.

In the second embodiment or version of this invention, there is an alternate way of driving the plunger (8), but the fruit juice extraction cycle is the same as in the first version described above. As shown in FIGURES 4 and 5, a linear actuator (2) drives two moveable peeler cups (4), each attached to one of the two extreme ends of the linear actuator (2) and guided linearly by the guide rails (17) which slide on bearing seats (18) mounted transversely and coincidentally with each other, being that the moveable peeler cups (4) move in the direction of the fixed peeler cups (3) which in turn are firmly attached to a structural chassis (1), while the motion of said moveable peeler cups (4) is solidly transmitted to vertical rods (6), in a synchronized manner such that these vertical rods will touch and initiate a linear dislodging the feeder mechanisms spring (5), thus allowing one of the fruit (19) to drop through the feeder duct and into the chamber formed by the intermeshing of the moveable peeler cup (4) and its matched pair fixed peeler cup (3). In continuation of the extraction cycle, the fruit (19) now

held in the chamber formed by the intermeshing of the
moveable peeler cup (4) and its matched pair fixed peeler
cup (3), is the pressed by the moveable peeler cup (4)
into the fixed peeler cup (3), since both have multiple
5 radially cut openings, the action causes the skin of the
fruit to be sheared in multiple strips (12) which pass
through the peeler cups radial openings and fall
vertically, while the fruit's core (13) is taken inside
the filtering device (7) since this filtering device has
10 a circular sharp cutting point at its forward opening,
permitting the fruit's core to enter completely into the
filter (7), which has radially cuts slits which allow for
the extracted juice (11) to flow through and be collected
in the space formed by the inside of the fixed peeler cup
15 (3) and the juice collector (10). In the final stages of
the extraction cycle, driven by the action of linear
actuator (2), the moveable peeler cup (4) moves back and
away from the fixed peeler cup (3), and since it is
solidly fixed to a transverse cross member (20), causes
20 the simultaneously driving of said cross member (20),
which in turn is attached through the pull rods (15) to
another transverse cross member (9) at the opposite end,
to which plunger (8) is firmly fixed, thus driving said

plunger (8) to travel through the filter and push directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter (7) and, finally, the dried fruit core (13) falls into
5 and through the chamber formed by the fixed (3) and moveable (4) peeler cups, and is directed to further fall through the fruit core receiving duct (14), in a manner so that all of the byproducts being produced: juice (11), peel (12) and core (13), can now be directed respectively
10 to other stages of processing. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Given that the geometry and configuration is as shown, one can see that the pair of peeler cups (3) and (4) at one end
15 of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups, the juice extraction cycle is exactly identical and fully described above.

20 It can be understood that there is yet another manner of driving the plunger (8) (although NOT shown in FIGURES 1 - 5), that is by placing a linear actuator fixed directly to structural chassis (1) and attaching

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the driving end of said actuator to plunger (8), one can drive said plunger (8) to travel through the filter (7) and push directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core falls into and through the chamber formed by the fixed (3) and moveable (4) peeler cups, and is directed to further fall through the fruit core receiving duct (14), in a manner so that all of the byproducts being produced: juice (11), peel (12) and core (13), can now be directed respectively to other stages of processing. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Given that the geometry and configuration is as shown, one can see that the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups, the juice extraction cycle is exactly identical and fully described above.

The invention also includes, in all configurations and versions, clean-in-place spray nozzles (21) mounted at different positions on structural chassis (1), in a

manner such that liquid and/or vaporized sprays can be utilized automatically, controlled by computer or other methods, for automatic cleaning of the machine at predetermined time periods as deemed necessary.

5 The "IMPROVED CONFIGURATION FOR A SELF-CLEANING
FILTER WITH REMOVABLE PERFORATING POINT FOR THE
EXTRACTION OF FRUIT JUICE," object of this application
for utility patent, consists of a cylindrical filtering
device such as device 7 or F of the invention in
10 "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM"
illustrated in FIGURES 1 - 5. Device 7, best seen in
FIGURES 6 - 9, has a filter body (51) constructed of
stainless steel or other food grade, nontoxic materials
developed with the purpose of obtaining high quality and
15 large quantities of juice from citrus fruit and other
round or near-round non-citrus fruit.

 The main body (51) of the filter is in a tubular
cylindrical shape where at one extreme end a removable
cylindrical perforating cutting edge (52) is attached, by
20 threads or other methods, and is constructed so as to
terminate in a sharp knife edged circular point (53),
which functions by first perforating the fruit's peel in
a manner such that permits the pumping action of a

moveable peeler cup (6) (a concave and radially cut hemisphere) to force a core section (13 or C) of fruit to enter completely into said filter (7 or F), where simultaneously, due to the high pressure generated by the action, the juice (11 or J) is forced to flow through the multitude of conically shaped transverse radial slits that are positioned parallel with respect to each other, thus separating and filtering the liquid juice (J) from solid components of the fruit's core (C).

10 The filter's main body (51) is of constant cylindrical shape with a removable cylindrical perforating cutting edge (52) attached at one extreme end of said main body (51), which in turn is configured to have a multitude of transverse radial slits (54) with
15 conical, or V-shaped, format, positioned parallel with respect to each other (55), and which can be spaced and sized variably, dependent on the juice (J) product desired to be produced. The nature and numbers of the multitude of transverse radial slits (54) with conical,
20 or V-shaped, generate greater efficiency and yield in juice extraction, since this shape generates a greater pressure differential between the inside and outside portions of the filter, in fact, inducing a "Venturi

Effect" which accelerates juice flow from the inside to the outside of the filter, thus promoting greater juice (J) yield and greater productivity by helping to maintain these passageways clear of obstructions and reducing clogging and cleaning frequency.

FIGURE 1 shows, as an example, a juice extraction machine, where one can observe the positioning of the self-cleaning filters (7 or F), object of this application for "IMPROVED CONFIGURATION FOR A SELF-CLEANING FILTER WITH REMOVABLE PERFORATING POINT FOR THE EXTRACTION OF FRUIT JUICE," where all byproducts of extraction, such as juice (J), extracted from the fruit's core (C) and peel skin strips (P) were obtained from the fruit (19 or R). Also shown in FIGURE 1, is the layout of the fruit bin placement as well as the fixed peeler cups (3) and moveable peeler cups (4) and the linear actuator (2) which drives the moveable peeler cups (4) against the fixed peeler cups (3) while simultaneously actuating the feeder spring (5) which permits the continuous and synchronized feeding of fruit (R) for juice (J) extraction.

In the third embodiment or version 100 (the 100 series is used to identify identical components to the

of said moveable peeler cups (104) is solidly transmitted to vertical rods (106), in a synchronized manner such that these vertical rods will touch and initiate a linear dislodging of the feeder mechanism's spring (105), thus
5 allowing one of the fruit (119) to drop through the feeder duct and into the chamber formed by the intermeshing of the moveable peeler cup (104) and its matched pair fixed peeler cup (103).

In continuation of the extraction cycle, the fruit
10 (119) now held in the chamber formed by the intermeshing of the moveable peeler cup (104) and its matched pair fixed peeler cup (103), is then pressed by the moveable peeler cup (104) into the fixed peeler cup (103), since both have multiple radially cut openings, the action
15 causes the skin of the fruit to be sheared in multiple strips (112) which pass through the peeler cups' radial openings and fall vertically, while the fruit's core (113) is taken inside the filtering device (107) since this filtering device has a circular sharp cutting point
20 (such as point 53 of filtering device 7) at its forward opening, permitting the fruit's core (113) to enter completely into the filter (107), which has radially cuts slits which allow for the extracted juice (111) to flow

machine is ready to commence another fruit juice extraction cycle. Given that the geometry and configuration is as shown, one can see that the pair of peeler cups (103) and (104) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups, the juice extraction cycle is exactly identical and fully described above.

Embodiment 100 also includes clean-in-place spray nozzles (121) mounted at different positions on structural chassis (101), in a manner such that liquid and/or vaporized sprays can be utilized automatically, controlled by computer or other methods, for automatic cleaning of the machine at predetermined time periods as deemed necessary.

In the fourth embodiment or version 200 (the 200 series is used to identify identical components to the first through third embodiments unless a specific description is given, i.e., filtering device 207 is identical to filtering devices 7 and 107), as best seen in FIGURES 12 - 13, a linear actuator (202) drives both external moveable peeler cups (203) and internal moveable

53 of filtering device 7) at its forward opening, permitting the fruit's core (213) to enter completely into the filter (207), which has radially cuts slits which allow for the extracted juice (211) to flow through and be collected in the space formed by the inside of the external moveable peeler cup (203) and the juice collector (210).

In the final stages of the extraction cycle, as the internal moveable peeler cups (204) move back and away from the external moveable peeler cups (203), linear actuator (202) drives the peeler cup supports (222, 223) which in turn are attached to a transverse cross member (209) to which the plunger (208) is firmly fixed, thus driving said plunger (208) to travel through the filter (207) and to push directly on the fruit's core (213) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core is forced (by a following core) through the chamber (245) positioned at the inner or back end of internal moveable peeler cup (204), and is directed to further pass through the fruit core receiving duct (214) which is integral with core chamber (245) and angulated downwardly so that the fruit's core (213) can actually fall under the force

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of gravity through the duct (214), in a manner so that all of the by-products being produced: juice (211), peel (212) and core (213), can now be directed respectively to other stages of processing. With the internal moveable peeler cup (204) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Given that the geometry and configuration is as shown, one can see that the pair of moveable peeler cups (203) and (204) at one end of the machine will be out of phase (but not by 180 degrees) with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups, the juice extraction cycle is exactly identical and fully described above.

15 Embodiment 200 also includes clean-in-place spray nozzles (221) mounted at different positions on structural chassis (201), in a manner such that liquid and/or vaporized sprays can be utilized automatically, controlled by computer or other methods, for automatic
20 cleaning of the machine at predetermined time periods as deemed necessary.

What is claimed as invention is:

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1. "IMPROVEMENTS IN A MODULAR FRUIT JUICE
EXTRACTION SYSTEM," an invention composed of two fixed
peeler cups (3) attached to a structural chassis (1) and
two matching moveable peeler cups (4), one pair of fixed
5 and moveable peeler cups (3) and (4), each pair located
at opposite ends of the machine, where the moveable
peelers cups (4) are each attached to opposite ends of a
single linear actuator (2), which can employ various
drive technologies, including hydraulic, pneumatic,
10 electric, geared, screw and/or any combination of known
linear drive systems that, in a back and forth cycle,
drives both movable peeler cups (4). The system is
composed of a moveable peeler cup (4) at each of the
extreme ends of the linear actuator (2), driven in a
15 manner that maximizes the productivity of the drive
motion, since when one peeler cup (4) is opening to allow
a fruit (19) to fall within its concave and radially cut
chamber, formed in conjunction with its matching pair
fixed peeler cup (3), at the same time the moveable
20 peeler cup (4) at the opposite end of linear actuator (2)
is closing upon the fruit (19) inside the chamber formed
by the intermeshing of peeler cups (3) and (4), and
shearing the fruit's skin (12) as it initiates the

peeling process and continues on to complete the juicing cycle by pumping the fruit's core (13) into the filtering device (7) and, since this filtering device has a circular sharp cutting point at its forward opening, it permits the fruit's core (13) to enter completely into the filter (7), which has radially cuts slits which allow for the extracted juice (11) to flow through and be collected in the space formed by the inside of the fixed peeler cup (3) and the juice collector (10), followed by the motion of plunger (8) which travels through the filter and pushes directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core falls into and through the chamber formed by the fixed (3) and moveable (4) peeler cups, and is directed to further fall through the fruit core receiving duct (14), in a manner so that all of these byproducts being produced: juice (11), peel (12) and core (13), can now be separately directed to other stages of processing. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the configuration is symmetrical as shown in Figures 1 through 5, the pair of peeler cups (3) and (4)

at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups (3) and (4),
5 the juice extraction cycle is exactly identical.

2. "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM," an invention configured as described in CLAIM 1, characterized by a first version in which in the final stages of the extraction cycle, as the moveable
10 peeler cups (4) move back and away from the fixed peeler cups (3), linear actuators (16) drive the pull rods (15), which in turn are attached to a transverse cross member (9) to which the plunger (8) is firmly fixed, thus drive said plunger (8) to travel through the filter and push
15 directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core falls into and through the chamber formed by the fixed (3) and moveable (4) peeler cups, and is directed to further fall through the
20 fruit core receiving duct (14), in a manner so that all of the byproducts being produced: juice (11), peel (12) and core (13), can now be directed separately to other stages of processing. With the moveable peeler cup (4) in

the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the geometry and configuration is symmetrical as shown, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups, the juice extraction cycle is exactly identical. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the configuration is symmetrical as shown in Figures 1 through 5, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups (3) and (4), the juice extraction cycle is exactly identical.

3. "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM," an invention configured as described in CLAIM 1, characterized by a second version in which in the final stages of the extraction cycle, driven by the action of linear actuator (2), the moveable peeler cup

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(4) moves back and away from the fixed peeler cup (3), and since it is solidly fixed to a transverse cross member (20), causes the simultaneous driving of said cross member (20), which in turn is attached through the pull rods (15) to another transverse cross member (9) at the opposite end, to which plunger (8) is firmly fixed, thus driving said plunger (8) to travel through the filter and push directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter (7) and, finally, the dried fruit core (13) falls into and through the chamber formed by the fixed (3) and moveable (4) peeler cups, and is directed to further fall through the fruit core receiving duct (14), in a manner so that all of the byproducts being produced: juice (11), peel (12) and core (13), can now be directed separately to other stages of processing. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the geometry and configuration is symmetrical as shown, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the

machine, or, at either pair of peeler cups, the juice extraction cycle is exactly identical. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle.

5 Since the configuration is symmetrical as shown in Figures 1 through 5, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the
10 machine, or, at either pair of peeler cups (3) and (4), the juice extraction cycle is exactly identical.

4. "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM," an invention configured as described in CLAIM 1, characterized by a third version (NOT SHOWN)
15 comprehended by yet another manner of driving the plunger (8). By placing a linear actuator fixed directly to structural chassis (1) and attaching the driving end of said actuator to plunger (8), actuation will drive said plunger (8) to travel through the filter and push
20 directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core falls into and through the chamber formed by the fixed (3) and moveable (4)

peeler cups, and is directed to further fall through the fruit core receiving duct (14), in a manner so that all of the byproducts being produced: juice (11), peel (12) and core (13), can now be directed respectively to other stages of processing. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the configuration is symmetrical as shown in Figures 1 through 5, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups (3) and (4), the juice extraction cycle is exactly identical.

5. "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM," an invention configured as described in CLAIM 1, characterized by including, in all configurations and versions, clean-in-place spray nozzles (21) mounted at different positions on structural chassis (1), in a manner such that, liquid and/or vaporized sprays can be utilized automatically, controlled by computer or other methods, for automatic cleaning of the machine at predetermined time periods as deemed

necessary.

6. "IMPROVEMENTS IN A MODULAR FRUIT JUICE
EXTRACTION SYSTEM," an invention configured as described
in CLAIM 1, characterized by a basic module which
5 contains two pairs of peeler cups (3) and (4), each pair
located at opposite and symmetrical ends of the machine
as shown in FIGURES 1 through 5, and thus as a basic
module, can be arranged on a multiple basis, in a
parallel or other manner, allowing for an initial single
10 module to be used and permitting that, over time, many
more modules can be installed in juice production
facilities, permitting flexible and economic growth of
one's juice production plant and assuring the advantages
of quality and organoleptic benefits of the juice
15 extracted by this technology, independently of the size
of the production capabilities.

7. A fruit juice extraction apparatus comprising:
two fixed peeler cups and two moveable peeler cups
attached to a chassis in mating pairs of fixed and
20 moveable peeler cups, said cups being concave
hemispheres, each pair being located at opposing ends of
said chassis, where said moveable peeler cups are each
attached to opposing ends of a single linear drive

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actuator for driving both movable peeler cups in a back
and forth cycle, said moveable peeler cup at each of the
ends of said linear actuator being driven in a manner
such that when one of said peeler cups is opening to
5 allow an article of fruit to fall within its concave
chamber formed in conjunction with its mating fixed
peeler cup, said moveable peeler cup at the opposing end
of said linear actuator is closing upon said fruit inside
said chamber formed by the intermeshing of said moveable
10 and fixed peeler cups, and shearing said fruit's skin as
it initiates the peeling process and continues to
complete the juicing cycle by pumping said fruit's core
through a filtering means mounted in said mating fixed
peeler cup, said filtering means having a cutting point
15 at its forward opening and radially cut slits to permit
said fruit's core to enter completely into said filtering
means which allows for the extracted juice to flow
through and be collected in juice collection means
connected to said fixed peeler cup, followed by the
20 motion of a plunger which travels through said filtering
means and pushes directly on said fruit's core until said
core is expelled completely from the forward end of said
filtering means and, whereby, the dried fruit core of

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said fruit falls into and through the chamber formed by
said fixed and moveable peeler cups, and is directed to
further fall through a fruit core receiving means,
whereby when said moveable peeler cup is in the full open
5 position, said apparatus is positioned to commence
another fruit juice extraction cycle.

8. The apparatus of CLAIM 7, wherein said pair of
peeler cups positioned at one end of said apparatus are
180 degrees out of phase with respect to said pair of
10 peeler cups at the opposing end of said apparatus.

9. The apparatus of CLAIM 7, wherein when said
moveable peeler cups move back and away from said fixed
peeler cups, said linear drive actuator drives said
plunger through said filtering means, whereby said
15 fruit's core is expelled completely from the forward end
of said filtering means and the dried fruit core falls
into and through said chamber formed by said fixed and
moveable peeler cups.

10. The apparatus of CLAIM 7, further comprising
20 spray nozzles mounted at selected positions on said
chassis.

11. A fruit juice extraction apparatus comprising:
a chassis having mounted thereon juice

extraction means;

5 said juice extraction means having means for
storing said fruit, said storing means having a plurality
of apertures therein for allowing articles of said fruit
to be deposited between at least two pairs of mating
concave hemispheres, each of said pairs having one
movable and one fixed hemisphere;

10 drive means for actuating means for forcing
each of the movable of said concave hemispheres against
its mating fixed concave hemisphere, thereby pressing an
article of said fruit deposited between said hemispheres;

15 each of said movable concave hemispheres having
a central pin and each of said fixed concave hemispheres
having a perforating tube for the extraction of juice
from said article of fruit, whereby the solid residue is
deposited in a receptacle and the liquid is passed
through a filter and then falls into a reservoir which
has outlet ports therein.

20 12. The apparatus of CLAIM 11, wherein said
perforating tube has multiple transverse slits of
increasing diameter from inside to outside.

13. The apparatus of CLAIM 11, wherein each of said
concave hemispheres having its concave surface defined by

a plurality of spaced-apart radial blades.

14. The apparatus of CLAIM 13, wherein said radial blades of each of said hemispheres are of at least two different lengths.

5 15. The apparatus of CLAIM 14, wherein when said movable hemisphere is forced against its mating fixed hemisphere, said radial blades of said movable hemisphere are positioned intermediate said radial blades of said fixed hemisphere.

10 16. The apparatus of CLAIM 11, wherein said movable hemispheres are attached to opposing ends of said forcing means for driving both movable hemispheres in a back and forth cycle, said moveable hemispheres at each of the ends of said forcing means being driven in a manner such
15 that when one of said movable hemispheres is opening to allow said article of fruit to fall between it and its mating fixed hemisphere, said moveable hemisphere at the opposing end of said forcing means is closing upon said fruit between it and said other of said fixed hemispheres
20 and shearing said fruit's skin as it initiates the peeling process and continues to complete the juicing cycle by forcing said fruit's core through its said perforating tube, whereby extracted juice flows to said

reservoir.

17. The apparatus of CLAIM 16, further comprising a plunger which moves through each of said tubes and expels said fruit's core from the forward end of said tubes and, whereby when one of said moveable hemispheres is in the full open position, said apparatus is positioned to commence another fruit juice extraction cycle.

18. "IMPROVED CONFIGURATION FOR A SELF-CLEANING FILTER WITH REMOVABLE PERFORATING POINT FOR THE EXTRACTION OF FRUIT JUICE," consisting of a cylindrical filter body (1) constructed of stainless steel or other food grade, nontoxic materials, where at one extreme end a removable cylindrical perforating cutting edge (2) is attached, by threads or other methods, and is constructed so as to terminate in a sharp knife edged circular point (3), which functions by first perforating the fruit's peel in a manner such that permits the pumping action of a moveable peeler cup (6) (a concave and radially cut hemisphere) to force a core section of fruit (C) to enter completely into said filter (F), and since the main body (1) of the filter is of a tubular cylindrical shape and is configured to have a multitude of transverse radial

slits (4) with conical, or V-shaped, format, positioned parallel with respect to each other (5), and which can be spaced and sized variably, dependent on the juice (J) can produce many juice products with varying desired characteristics. The nature and numbers of the multitude of transverse radial slits (4) with conical, or V-shaped, generate greater efficiency and yield in juice extraction, due to a pressure differential between the inside and outside portions of the filter, inducing a "Venturi Effect" which accelerates juice flow from the inside to the outside of the filter, thus promoting greater juice (J) yield and greater productivity by helping to maintain these passageways clear of obstructions and reducing clogging and cleaning frequency.

19. A filter for use in an apparatus for the extraction of fruit juice comprising:

a cylindrical filter body having connected at one end thereof a removable cylindrical perforating cutting edge terminating in a circular point, for perforating the peel of an article of fruit, whereby a moveable concave and radially cut hemisphere of said apparatus forces a core section of said fruit to enter said filter body,

said filter body having a plurality of spaced-apart parallel transverse radial slits therein.

20. The filter of CLAIM 19 wherein said filter body is of nontoxic materials.

5 21. A fruit juice extraction apparatus comprising:
a chassis having mounted thereon juice extraction means;

said juice extraction means having means for storing said fruit, said storing means having a plurality
10 of apertures therein for allowing articles of said fruit to be deposited between at least two pairs of mating radially cut and concave hemispheres, each of said pairs having one movable and one fixed hemisphere;

drive means for actuating means for forcing
15 each of the movable of said concave hemispheres against its mating fixed concave hemisphere, thereby pressing an article of said fruit deposited between said hemispheres;

each of said movable concave hemispheres having a central pin and each of said fixed concave hemispheres
20 having a perforating tube for the extraction of juice from said article of fruit, whereby the solid residue is deposited in a receptacle and the liquid is passed through a filter and then falls into a reservoir which

has outlet ports therein;

5 said filter comprising a cylindrical filter body of nontoxic materials, having connected at one end thereof a removable cylindrical perforating cutting edge terminating in a circular point, for perforating the peel of said article of fruit, whereby said moveable concave and radially cut hemisphere forces a core section of said fruit to enter said filter body, said filter body having a plurality of spaced-apart parallel transverse radial
10 slits.

22. The apparatus of CLAIM 21, wherein said transverse slits are of increasing diameter from inside to outside.

23. A fruit juice extraction apparatus comprising:
15 two fixed peeler cups and two moveable peeler cups attached to a chassis in mating pairs of fixed and moveable peeler cups, said cups being concave hemispheres, each pair being located at opposing ends of said chassis, where said moveable peeler cups are each
20 attached to opposing ends of a single linear drive actuator for driving both movable peeler cups in a back and forth cycle, said moveable peeler cup at each of the ends of said linear actuator being driven in a manner

such that when one of said peeler cups is opening to
allow an article of fruit to fall within its concave
chamber formed in conjunction with its mating fixed
peeler cup, said moveable peeler cup at the opposing end
5 of said linear actuator is closing upon said fruit inside
said chamber formed by the intermeshing of said moveable
and fixed peeler cups, and shearing said fruit's skin as
it initiates the peeling process and continues to
complete the juicing cycle by pumping said fruit's core
10 through a filtering means mounted in said mating fixed
peeler cup, said filtering means having a cutting point
at its forward opening and radially cut slits to permit
said fruit's core to enter completely into said filtering
means which allows for the extracted juice to flow
15 through and be collected in juice collection means
connected to said fixed peeler cup, followed by the
motion of a plunger which travels through said filtering
means and pushes directly on said fruit's core until said
core is expelled completely from the forward end of said
20 filtering means and, whereby, the dried fruit core of
said fruit is forced through said moveable peeler cups,
and is directed to further fall through a fruit core
receiving means, whereby when said moveable peeler cup is

in the full open position, said apparatus is positioned to commence another fruit juice extraction cycle.

24. The apparatus of CLAIM 23, wherein said pair of peeler cups positioned at one end of said apparatus are
5 180 degrees out of phase with respect to said pair of peeler cups at the opposing end of said apparatus.

25. The apparatus of CLAIM 23, wherein when said moveable peeler cups move back and away from said fixed peeler cups, said linear drive actuator drives said
10 plunger through said filtering means, whereby said fruit's core is expelled completely from the forward end of said filtering means and the dried fruit core falls into and through said chamber formed by said fixed and moveable peeler cups.

26. The apparatus of CLAIM 23, further comprising
15 spray nozzles mounted at selected positions on said chassis.

27. The apparatus of CLAIM 23, channel means is positioned in said moveable peeler cups to direct said
20 fruit forced through said moveable peeler cups to further fall through a fruit core receiving means, said receiving means be angulated downwardly with respect to the said moveable peeler cup within which it is positioned.

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28. A fruit juice extraction apparatus comprising:
a chassis having mounted thereon juice
extraction means;

5 said juice extraction means having means for
storing said fruit, said storing means having a plurality
of apertures therein for allowing articles of said fruit
to be deposited between at least two pairs of mating
concave hemispheres, each of said pairs having one
movable and one fixed hemisphere;

10 drive means for actuating means for forcing
each of the movable of said concave hemispheres against
its mating fixed concave hemisphere, thereby pressing an
article of said fruit deposited between said hemispheres;

15 each of said movable concave hemispheres having
a central pin and each of said fixed concave hemispheres
having a perforating tube for the extraction of juice
from said article of fruit, whereby the solid residue is
deposited in a receptacle and the liquid is passed
through a filter and then falls into a reservoir which
20 has outlet ports therein and the dried fruit core of said
fruit is forced through said moveable peeler cups.

29. The apparatus of CLAIM 28, wherein said
perforating tube has multiple transverse slits of

formed in conjunction with its mating external peeler cup, said internal moveable peeler cup at the opposing end of said linear actuator is closing upon said fruit inside said chamber formed by the intermeshing of said internal and external moveable peeler cups, and shearing said fruit's skin as it initiates the peeling process and continues to complete the juicing cycle by pumping said fruit's core through a filtering means mounted in said mating fixed peeler cup, said filtering means having a cutting point at its forward opening and radially cut slits to permit said fruit's core to enter completely into said filtering means which allows for the extracted juice to flow through and be collected in juice collection means connected to said fixed peeler cup, followed by the motion of a plunger which travels through said filtering means and pushes directly on said fruit's core until said core is expelled completely from the forward end of said filtering means and, whereby, the dried fruit core of said fruit is forced through said internal moveable peeler cups, and is directed to further fall through a fruit core receiving means, whereby when said moveable peeler cup is in the full open position, said apparatus is positioned to commence another fruit

juice extraction cycle.

36. The apparatus of CLAIM 35, wherein said pair of peeler cups positioned at one end of said apparatus are 180 degrees out of phase with respect to said pair of peeler cups at the opposing end of said apparatus.

37. The apparatus of CLAIM 35, wherein when said internal moveable peeler cups move back and away from said external peeler cups, said linear drive actuator drives said plunger through said filtering means, whereby said fruit's core is expelled completely from the forward end of said filtering means and the dried fruit core falls into and through said chamber formed by said internal and external moveable peeler cups.

38. The apparatus of CLAIM 35, further comprising spray nozzles mounted at selected positions on said chassis.

39. The apparatus of CLAIM 35, channel means is positioned in said internal moveable peeler cups to direct said fruit forced through said internal moveable peeler cups to further fall through a fruit core receiving means, said receiving means be angulated downwardly with respect to the said internal moveable peeler cup within which it is positioned.

40. A fruit juice extraction apparatus comprising:
a chassis having mounted thereon juice
extraction means;

5 said juice extraction means having means for
storing said fruit, said storing means having a plurality
of apertures therein for allowing articles of said fruit
to be deposited between at least two pairs of mating
concave hemispheres, each of said pairs having one
internal movable and one external moveable hemisphere;

10 drive means for actuating means for forcing
each of the internal movable of said concave hemispheres
against its mating external moveable concave hemisphere,
thereby pressing an article of said fruit deposited
between said hemispheres;

15 each of said external movable concave
hemispheres having a central pin and each of said
internal moveable concave hemispheres having a
perforating tube for the extraction of juice from said
article of fruit, whereby the solid residue is deposited
20 in a receptacle and the liquid is passed through a filter
and then falls into a reservoir which has outlet ports
therein and the dried fruit core of said fruit is forced
through said internal moveable peeler cups.

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fruit's core (13) into the filtering device (7) and, since this filtering device has a circular sharp cutting point at its forward opening, it permits the fruit's core (13) to enter completely into the filter (7), which has

5 radially cuts slits which allow for the extracted juice (11) to flow through and be collected in the space formed by the inside of the fixed peeler cup (3) and the juice collector (10), followed by the motion of plunger (8) which travels through the filter and pushes directly

10 on the fruit's core (13) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core falls into and through the chamber formed by the fixed (3) and moveable (4) peeler cups, and is directed to further fall through the fruit

15 core receiving duct (14), in a manner so that all of these by-products being produced: juice (11), peel (12) and core (13), can now be directed separately to other stages of processing. Three possible versions can be deployed for actuating the plunger (8), but in all cases,

20 the objective is to drive said plunger (8) to travel through the filter and to push directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core falls into and through the chamber formed by the

25 fixed (3) and moveable (4) peeler cups, and is directed to further fall through the fruit core receiving duct

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(14), in a manner so that all of these byproducts being produced: juice (11), peel (12) and core (13), can now be directed respectively to other stages of processing. In all versions, clean-in-place spray nozzles (21) are mounted at different positions on structural chassis (1), in a manner such that, liquid and/or vaporized sprays can be utilized automatically, controlled by computer or other methods, for automatic cleaning of the machine at predetermined time periods as deemed necessary. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the configuration is symmetrical as shown in Figures 1 through 5, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups (3) and (4), the juice extraction cycle is exactly identical.

"IMPROVED CONFIGURATION FOR A SELF-CLEANING FILTER WITH REMOVABLE PERFORATING POINT FOR THE EXTRACTION OF FRUIT JUICE," consisting of a cylindrical filter (50) having a body (51) constructed of stainless steel or other food grade, nontoxic materials, where at one extreme end a removable cylindrical perforating cutting edge (52) is attached, by threads or other methods, and is constructed so as to terminate in a sharp knife edged

circular point (53), which functions by first perforating the fruit's peel in a manner such that permits the pumping action of a moveable peeler cup (4) (a concave and radially cut hemisphere) to force a core section of fruit (C) to enter completely into said filter (7 or F), and since the main body (51) of the filter is of a tubular cylindrical shape and is configured to have a multitude of transverse radial slits (54) with conical, or V-shaped, format, positioned parallel with respect to each other (55), and which can be spaced and sized variably, dependent on the juice (J) can produce many juice products with varying desired characteristics. The nature and numbers of the multitude of transverse radial slits (54) with conical, or V-shaped, generate greater efficiency and yield in juice extraction, due to a pressure differential between the inside and outside portions of the filter, in fact, inducing a "Venturi Effect" which accelerates juice flow from the inside to the outside of the filter, thus promoting greater juice (J) yield and greater productivity by helping to maintain the passageway clear of obstructions and reducing clogging and cleaning frequency. The proposed invention functions by first perforating the fruit's peel in a manner such that permits the pumping action of a moveable peeler cup (4) against a fixed peeler cup (3) forces a core section of fruit (C) to enter completely into said

1997-1998		1998-1999		1999-2000		2000-2001		2001-2002		2002-2003		2003-2004		2004-2005		2005-2006		2006-2007		2007-2008		2008-2009		2009-2010		2010-2011		2011-2012		2012-2013		2013-2014		2014-2015		2015-2016		2016-2017		2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2023-2024		2024-2025		2025-2026		2026-2027		2027-2028		2028-2029		2029-2030		2030-2031		2031-2032		2032-2033		2033-2034		2034-2035		2035-2036		2036-2037		2037-2038		2038-2039		2039-2040		2040-2041		2041-2042		2042-2043		2043-2044		2044-2045		2045-2046		2046-2047		2047-2048		2048-2049		2049-2050		2050-2051		2051-2052		2052-2053		2053-2054		2054-2055		2055-2056		2056-2057		2057-2058		2058-2059		2059-2060		2060-2061		2061-2062		2062-2063		2063-2064		2064-2065		2065-2066		2066-2067		2067-2068		2068-2069		2069-2070		2070-2071		2071-2072		2072-2073		2073-2074		2074-2075		2075-2076		2076-2077		2077-2078		2078-2079		2079-2080		2080-2081		2081-2082		2082-2083		2083-2084		2084-2085		2085-2086		2086-2087		2087-2088		2088-2089		2089-2090		2090-2091		2091-2092		2092-2093		2093-2094		2094-2095		2095-2096		2096-2097		2097-2098		2098-2099		2099-2100		2100-2101		2101-2102		2102-2103		2103-2104		2104-2105		2105-2106		2106-2107		2107-2108		2108-2109		2109-2110		2110-2111		2111-2112		2112-2113		2113-2114		2114-2115		2115-2116		2116-2117		2117-2118		2118-2119		2119-2120		2120-2121		2121-2122		2122-2123		2123-2124		2124-2125		2125-2126		2126-2127		2127-2128		2128-2129		2129-2130		2130-2131		2131-2132		2132-2133		2133-2134		2134-2135		2135-2136		2136-2137		2137-2138		2138-2139		2139-2140		2140-2141		2141-2142		2142-2143		2143-2144		2144-2145		2145-2146		2146-2147		2147-2148		2148-2149		2149-2150		2150-2151		2151-2152		2152-2153		2153-2154		2154-2155		2155-2156		2156-2157		2157-2158		2158-2159		2159-2160		2160-2161		2161-2162		2162-2163		2163-2164		2164-2165		2165-2166		2166-2167		2167-2168		2168-2169		2169-2170		2170-2171		2171-2172		2172-2173		2173-2174		2174-2175		2175-2176		2176-2177		2177-2178		2178-2179		2179-2180		2180-2181		2181-2182		2182-2183		2183-2184		2184-2185		2185-2186		2186-2187		2187-2188		2188-2189		2189-2190		2190-2191		2191-2192		2192-2193		2193-2194		2194-2195		2195-2196		2196-2197		2197-2198		2198-2199		2199-2200		2200-2201		2201-2202		2202-2203		2203-2204		2204-2205		2205-2206		2206-2207		2207-2208		2208-2209		2209-2210		2210-2211		2211-2212		2212-2213		2213-2214		2214-2215		2215-2216		2216-2217		2217-2218		2218-2219		2219-2220		2220-2221		2221-2222		2222-2223		2223-2224	
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filter (F), where simultaneously, due to the high pressure generated by the action, the juice (J) is forced to flow through the multitude of conically shaped transverse radial slits that are positioned parallel with respect to each other, thus separating and filtering the liquid juice (J) from solid components of the fruit's core (C). The removable cylindrical perforating cutting edge (52) simplifies replacement and permits for interchangeability with differently shaped cutting edges which can vary as desired in order to obtain greater juice (J) extraction performance, or higher juice quality, from the many varieties of citrus and other fruit.

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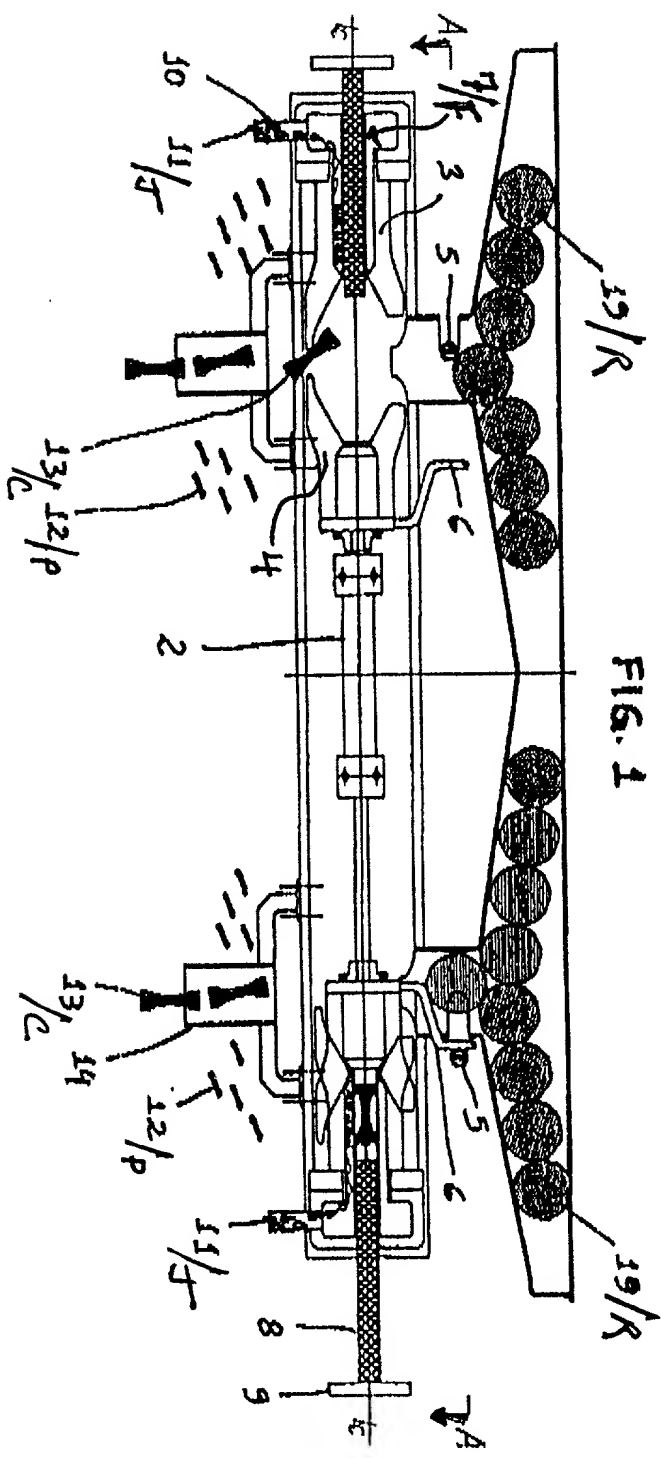


FIG. 1

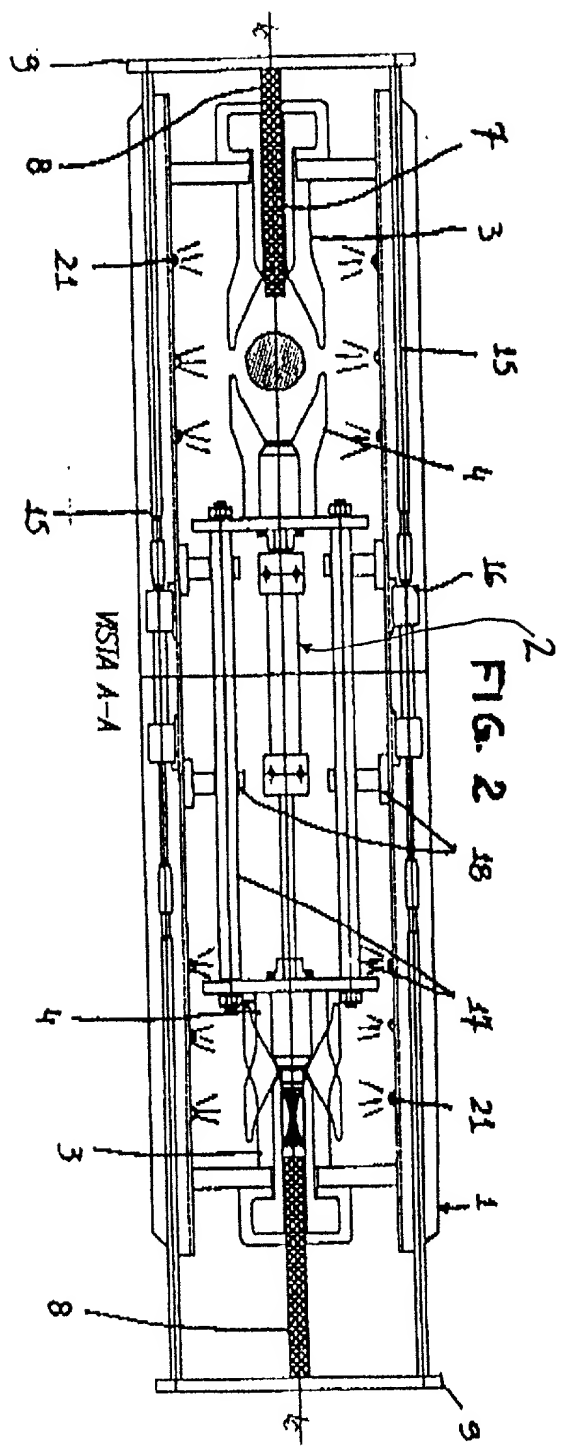


FIG. 2

FIG. 3

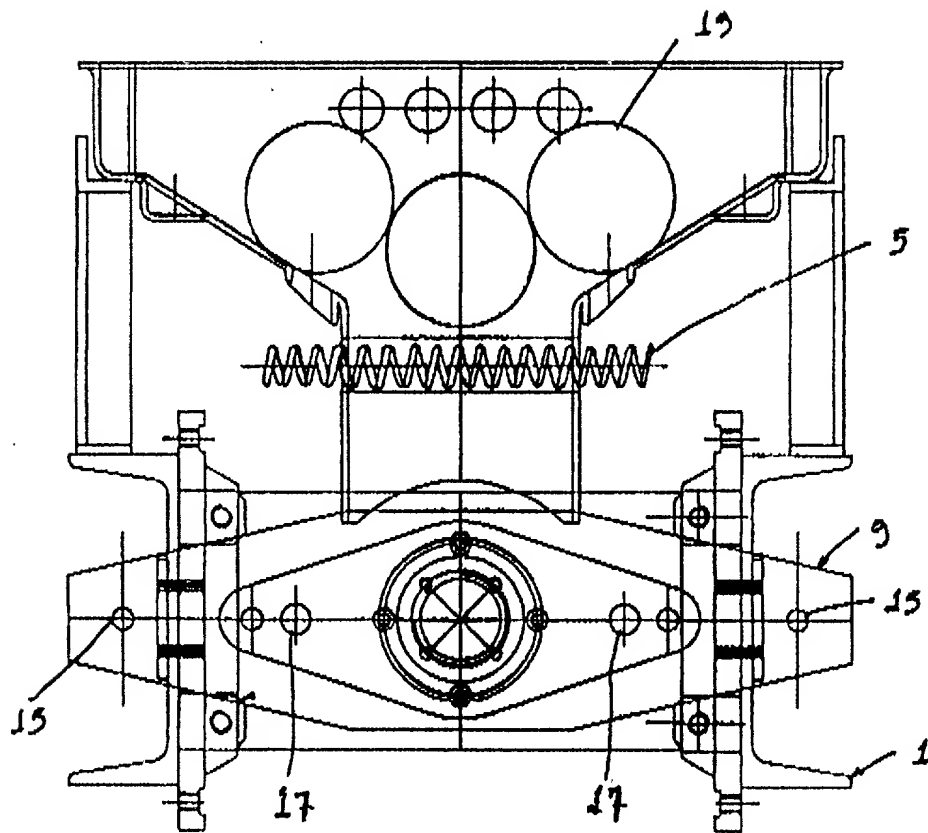


FIG. 4

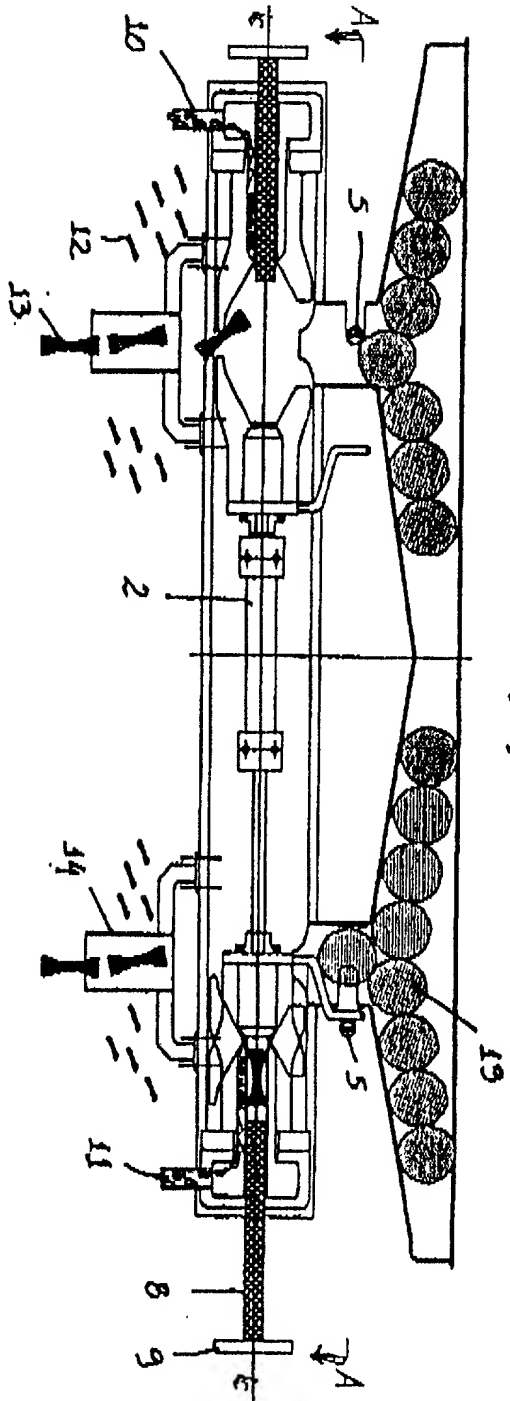


FIG. 5

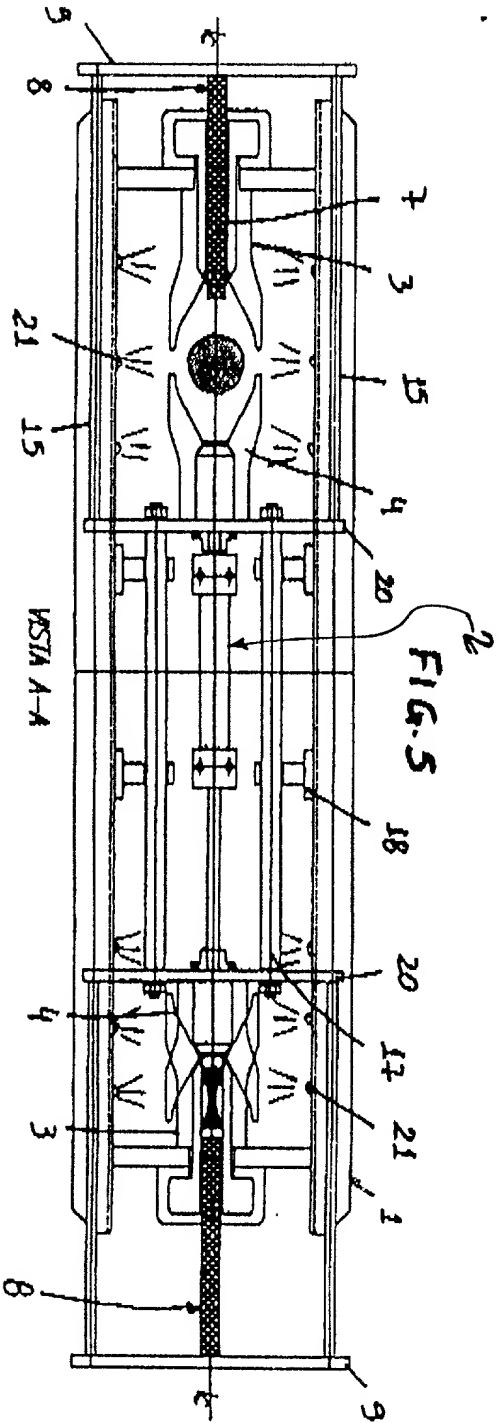
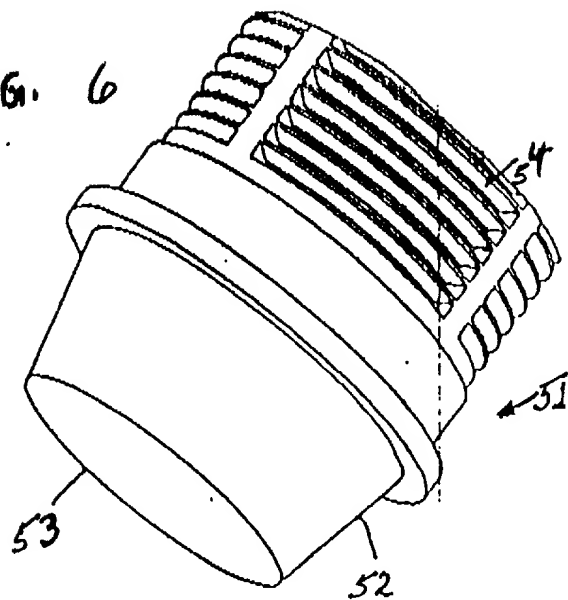


FIG. 6



DETAIL A

FIG. 7

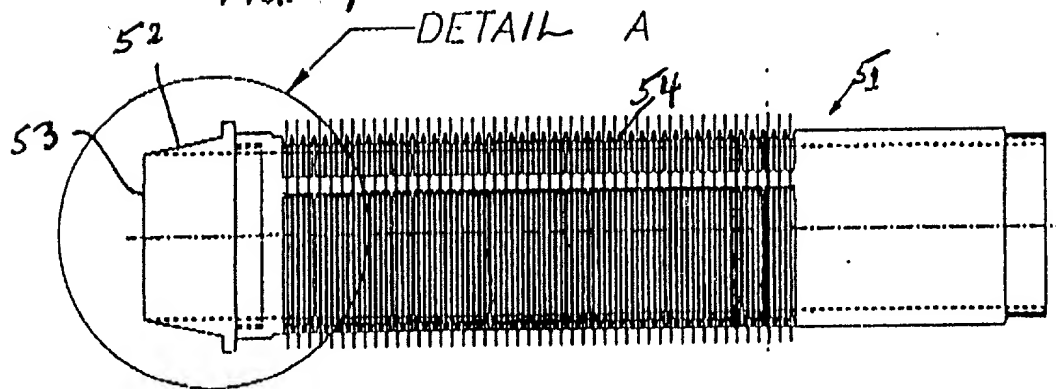
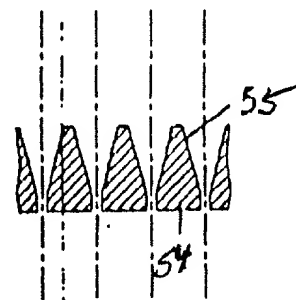
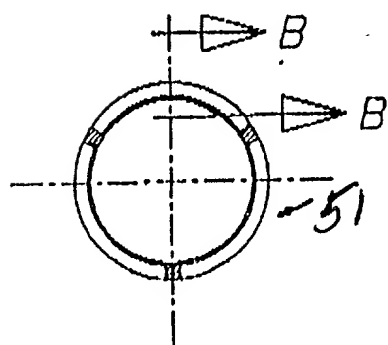


FIG. 9



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FIG. 8



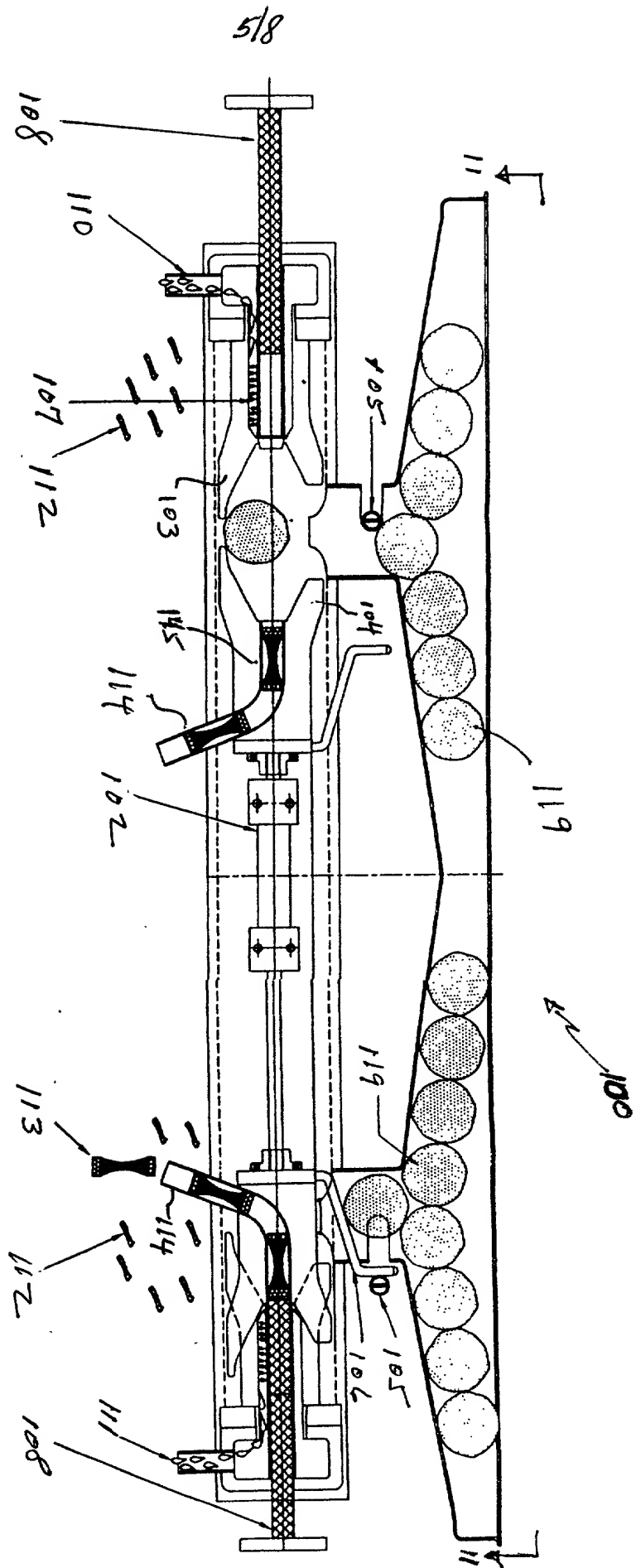


FIG 10

FIG 11

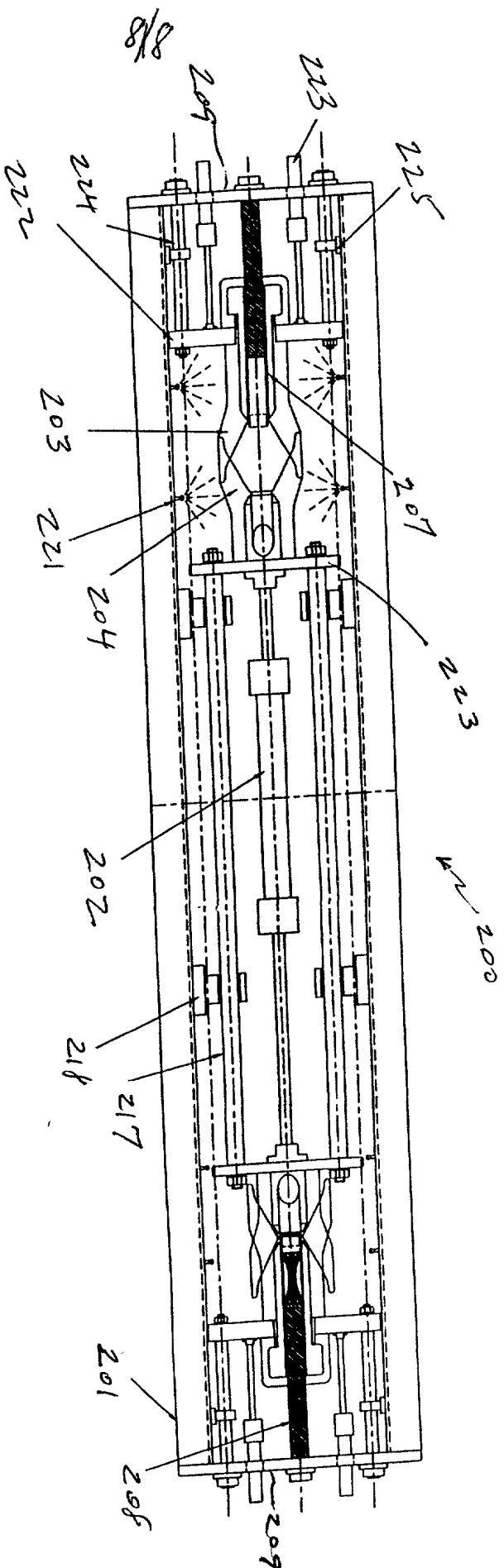
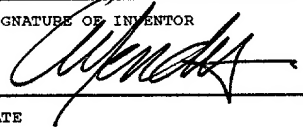


FIG 13

DECLARATION IN COPENDING APPLICATION CONTAINING
ADDITIONAL SUBJECT MATTER - PAGE 2 OF 2

DECLARATION IN COPENDING APPLICATION CONTAINING ADDITIONAL SUBJECT MATTER - PAGE 2 OF 2		ATTORNEY'S DOCKET NO.: M-95-3195 -U.20-CIP
<p>POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration no.)</p> <p style="text-align: center;">George A. BODE Reg. No. 30,028</p>		
SEND CORRESPONDENCE TO:	George A. Bode BODE & ASSOCIATES, P.C. 2314 Broadway New Orleans, LA 70125-4128	DIRECT TELECOMMUNICATIONS TO: (name and telephone & fax numbers) George A. BODE Tele: (504) 861-8288 Fax: (504) 866-6717
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Family Name	First Given Name	Second Given Name
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Avenida Eng Camilo DiNucci 5717	Araraquara, S.P.	Brazil
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Family Name	First Given Name	Second Given Name
City	State or Foreign Country	Country of Citizenship
Post Office Address	City	State & Zip Code/Country
Family Name	First Given Name	Second Given Name
City	State or Foreign Country	Country of Citizenship
Post Office Address	City	State & Zip Code/Country
<p>I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.</p>		
SIGNATURE OF INVENTOR	SIGNATURE OF INVENTOR	SIGNATURE OF INVENTOR
		
DATE	DATE	DATE
11 July 2000		

INVENTOR: CARLOS NETO MENDES
Rua Voluntários de Pátria, 1738
Araraquara, São Paulo, BRAZIL
CEP 14.801-320

"IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION
SYSTEM and CONFIGURATION FOR A SELF-CLEANING FILTER FOR
THE EXTRACTION OF FRUIT JUICE"

This application is a continuation-in-part
application of previous applications by the same inventor
bearing:

- 1) U.S. Serial No. 08/647,066 filed May 9, 1996,
(which claims priority, under 35 U.S. Code § 119 based on
Brazilian Application No. PI-9502244-9 filed June 19,
1995), now U.S. Patent No, 5,655,441 issued August 12,
1997;
- 2) U.S. Serial No. 08/681,627 filed July 29, 1996,
(which claims priority, under 35 U.S. Code § 119 based on
Brazilian Application No. MI-5501198-5 filed August 1,
1995) now U.S. Patent No, 5,720,218 issued February 24,
1998;
- 3) U.S. Serial No. 08/681,626 filed July 29, 1996,
(which claims priority, under 35 U.S. Code § 119 based on
Brazilian Application No. MU-7501779-2 filed August 1,
1995);
- 4) U.S. Serial No. 08/759,723 filed December 6,
1996, (which claims priority, under 35 U.S. Code § 119
based on Brazilian Application No. MU-7502784-4 filed
December 8, 1995);
- 5) U.S. Serial No. 08/759,722 filed December 6,
1996, (which claims priority, under 35 U.S. Code § 119
based on Brazilian Application No. MU-7502785-2 filed
December 8, 1995) now U.S. Patent No, 5,720,219 issued
February 24, 1998;
- 6) U.S. Serial No. 08/759,727 filed December 6,
1996, (which claims priority, under 35 U.S. Code § 119
based on Brazilian Application No. MU-7502786-0 filed
December 8, 1995);
- 7) U.S. Serial No. 08/763,679 filed December 11,
1996, (which claims priority, under 35 U.S. Code § 119
based on Brazilian Application No. MU-7502994-4 filed
December 15, 1995);

SCHEDULE A

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8) U.S. Serial No. 08/884,529 filed June 27, 1997, (which claims priority, under 35 U.S. Code § 119 based on Brazilian Applications No. PI-9502218-0 filed June 12, 1995; No. PI-9502244-9 filed June 19, 1995; No. MI-5501197-7 filed August 1, 1995; No. MI-5501198-5 filed August 1, 1995; No. MI-5501199-3 filed August 1, 1995; No. MU-7501779-2 filed August 1, 1995; No. MU-7501780-6 filed August 1, 1995; No. MU-7501781-4 filed August 1, 1995; No. PI-9503518-4 filed August 1, 1995; No. MU-7501563-3 filed August 7, 1995; No. PI-9503109-0 filed August 7, 1995; No. MI-5501053-9 filed August 7, 1995; No. MI-5501976-5 filed December 8, 1995; No. MU-7502784-4 filed December 8, 1995; No. MU-7502785-2 filed December 8, 1995; No. MU-7502786-0 filed December 8, 1995; and, No. MU-7502994-4 filed December 15, 1995);

9) U.S. Serial No. 09/028,187 filed February 23, 1998, (which claims priority, under 35 U.S. Code § 119 based on Brazilian Applications No. PI-9502218-0 filed June 12, 1995; No. PI-9502244-9 filed June 19, 1995; No. MI-5501197-7 filed August 1, 1995; No. MI-5501198-5 filed August 1, 1995; No. MI-5501199-3 filed August 1, 1995; No. MU-7501779-2 filed August 1, 1995; No. MU-7501780-6 filed August 1, 1995; No. MU-7501781-4 filed August 1, 1995; No. PI-9503518-4 filed August 1, 1995; No. MU-7501563-3 filed August 7, 1995; No. PI-9503109-0 filed August 7, 1995; No. MI-5501053-9 filed August 7, 1995; No. MI-5501976-5 filed December 8, 1995; No. MU-7502784-4 filed December 8, 1995; No. MU-7502785-2 filed December 8, 1995; No. MU-7502786-0 filed December 8, 1995; and, No. MU-7502994-4 filed December 15, 1995);

10) U.S. Serial No. 09/377,936 filed August 20, 1999, (which claims priority, under 35 U.S. Code § 119 based on all of the applications in Items 1 - 9 above); and,

11) U.S. Serial No. 09/377,937 filed August 20, 1999, (which claims priority, under 35 U.S. Code § 119 based on all of the applications in Items 1 - 9 above).